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OXYBELUS (ANOXYBELUS) MAIDLII KOHL, AN *OXYBELUS* WITH UNUSUAL FEATURES (HYMENOPTERA: SPHECOIDEA: CRABRONIDAE)

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Abstract.—The previously unknown male of the Indian *Oxybelus (Anoxybelus) maidlii* Kohl is described from Sri Lanka, and additional descriptive notes are given for the female. Males exhibit allometric growth. Females have a pair of processes on the posterior surface of the head that may function in prey carriage or nest construction. *Anoxybelus* Kohl is revalidated as a subgenus with two included species, *O. maidlii* from the Indian subcontinent and *O. stevensoni* Arnold from Zimbabwe.

Oxybelus maidlii Kohl (1924: 274–277, figs. 9, 10) has been a puzzle for years. Described from a single female from Abu, it was so unusual that Kohl proposed the new subgenus *Anoxybelus* for its reception. The anomaly was that this female lacked a mucro on the propodeum, whereas both sexes of all previously described *Oxybelus* possessed such a process. Subsequent aculeate hymenopterists were conservative in their treatment of the taxon, perhaps suspecting that Kohl described an aberrant specimen. Pate (1937: 387) retained *Anoxybelus* as a provisional subgenus, noting that the lack of a mucro appeared to be the only distinguishing character. Bohart and Menke (1976: 46) did not recognize any subgenera in *Oxybelus*, placing all genus-group names in synonymy.

During one of my trips to Sri Lanka I collected at Kondachchi, Ma Villu, Mannar District, 11–12 April 1981. This large area is being developed as a cashew plantation but substantial tracts of monsoon scrub jungle still remain. I obtained seven males of a distinctive species of *Oxybelus*. The species was unusual because of the variation in size coupled with an allometric development of several structures. It had a well developed mucro (Fig. 8). I placed it (1983: 38) as an unidentified species of Ceylonese *Oxybelus*, speculating that it might be the opposite sex of a species described from an Indian female.

In 1984 I received three *Oxybelus* that were collected in 1976 in Malaise traps at two sites near Padaviya, Anuradhapura District, by P. B. and S. Karunaratne and D. W. Balasooriya during field work for the Smithsonian Insect Project. A pair was collected 13–22 March in one trap and a single female 13–20 March in the other trap. The male is identical with my series from Kondachchi. The females agree perfectly with Kohl's description of *O. maidlii* including the lack of a propodeal mucro. There is excellent concordance between the females and males in the unusual coloration and in the surface sculpture, leaving no doubt that these are opposite sexes of the same species.

Distribution and Ecology

Kohl gave the type locality of *O. maidlii* as Abu, Baluchistan, now the westernmost province of Pakistan. Abu, however, is in the extreme southwestern part of Rajasthan, India. The type in the British Museum (Natural History) bears only one of Nurse's typed labels, "Abu." Nurse (1903: 393) noted that his specimens were collected by a native at Mount Abu in 1901. He said the climate at Deesa "about 40 miles distant" was hot and dry with an average annual rainfall "from 25 to 30 inches." The area around Mt. Abu is similarly xeric, and presumably has the same amount of rain, an annual average of 635–760 mm.

Ma Villu at Kondachchi is 5 km from the northwest coast, a few meters above sea level, and a short distance from Adams Bridge between Sri Lanka and India. Padaviya is about 100 km east of Ma Villu at an altitude of about 55 m. Both localities are in the Dry Zone and receive most of their average annual rainfall of 965 and 1490 mm respectively from October to December during the northeast monsoon.

The meager available data suggest that *O. maidlii* probably is restricted in Sri Lanka to the most xeric areas in the northwest at low altitudes, and perhaps also in similar xeric areas in the southeast. Presumably it may be found in similar situations in India and perhaps even as far as western Pakistan.

I collected the males at Ma Villu along a trail in the scrub jungle in a small area of a few square meters open to the sun. They were making short flights, frequently perching momentarily on desiccated, disintegrated strawy elephant dung. They were quite fresh and were probably awaiting the emergence of females from the sandy loam. The Padaviya specimens were captured in Malaise traps set at two sites in scrub jungle. Both sexes have a well developed pecten on the fore tarsi. Undoubtedly the females nest in the soil and the males dig resting burrows therein.

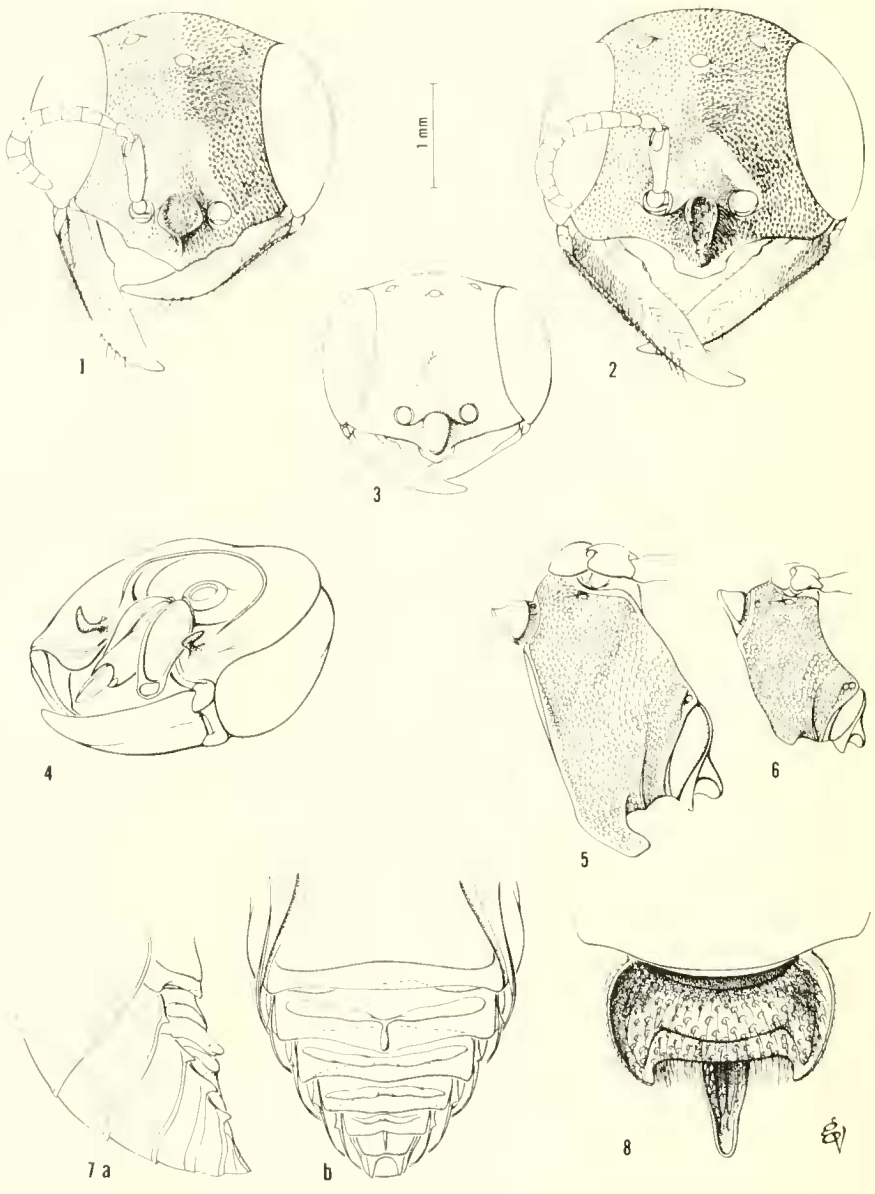
Systematics

Oxybelus maidlii exhibits several unusual characteristics that distinguish it from most species in the genus. Although the male has a mucro on the propodeum (Fig. 8) as do both sexes of other species in the genus, this peculiar feature is not present in the female. Both sexes have a light red scutum, seemingly a trivial character but actually of some significance at the subgeneric level.

The female has a pair of stout, angled, outwardly and obliquely directed processes on the posterior surface of the head (Fig. 4). The basal half of the clypeus in both sexes is strongly raised medially with curved or oblique lateral ridges that meet or almost meet below (Figs. 1–3).

The males vary greatly in size, the body length ranging from 5.8 to 8.7 mm. Allometric growth associated with increasing size is manifested in mandible length (Figs. 2, 3) and development of a ventral lamella on the mesopleuron (Figs. 5, 6). Allometric growth is also present on sterna III–VI of the male (Fig. 7) which have a series of transverse rounded ridges across the middle, decreasing in magnitude posteriorly, that on II with a median digitate process whose apex lies above but does not extend beyond the translucent apical third of the sternum.

Color and Vestiture.—Black, flagellum beneath and scutum light red as are the fore femur and tibia beneath of the female, the following white: basal two-thirds



Figs. 1–8. *Oxybelus (Anoxybelus) maidli* Kohl. 1, Female head, anterior aspect. 2, Head of large male, *idem*. 3, Head of small male, *idem*. 4, Female head, oblique view of posterior aspect, palpi omitted. 5, Mesopleuron of large male (pronotal lobe, tegula and wing base above; mid coxa at lower right). 6, Small male, *idem*. 7, Male abdominal segments II–VIII (a, lateral; b, ventral). 8, Male metanotum and propodeal mucro.

of mandible, scape beneath, short lateral stripe on pronotal collar, pronotal lobe, lateral spot on scutellum, squama and posterior half of metanotum except lateral and posterior margins colorless and transparent, small apical spot on femora, stripe on outer surface of anterior tibia, stripe beneath on posterior tibia of female, posterior tarsus of female, narrow stripes on posterior third of terga I–IV decreas-

ing in width posteriorly and narrowly separated along midline, female with large median blotch of variable extent merging with narrow line posteriorly on sternum II, and narrow median line on III, male with narrow stripes across the middle of sterna II–IV or V decreasing in width posteriorly, that on II broadened laterally, posterior third or less of sterna II–V (♀) or VI (♂) in both sexes translucent. Vestiture moderately dense on head, appressed on clypeus, front and gena, erect on ocellar area and vertex; median cell more sparsely setose on posterior half; sterna III–VII of male with brushes of longer erect cinereous setae.

Male.—Length 5.8–8.7 mm, forewing 4.1–5.9 mm. Head in frontal view (Figs. 2, 3), mandible disproportionately longer and vertex more arched above eyes in larger specimens; clypeus with basal prominence in middle margined by curved, occasionally obsolescent ridges, apical margin with rounded median lobe, edentate; front and vertex with close small punctures except scapal basin mostly smooth; ocellar tubercles and genal carina lacking.

Thorax with pronotal margin absent at angle, stronger on lobe than medially; mesonotum more strongly arched in larger specimens, median groove lacking; scutellum with median carina weak, present only posteriorly if at all; metanotum (Fig. 8) without median carina, squama evenly incurved and without inner lobe; mesopleuron in larger specimens with a large lamella anteroventrally (Fig. 5) which is reduced disproportionately in smallest specimens to a slight projection (Fig. 6); propodeal mucro (Fig. 8) tapering toward apex, basal width slightly less than half length.

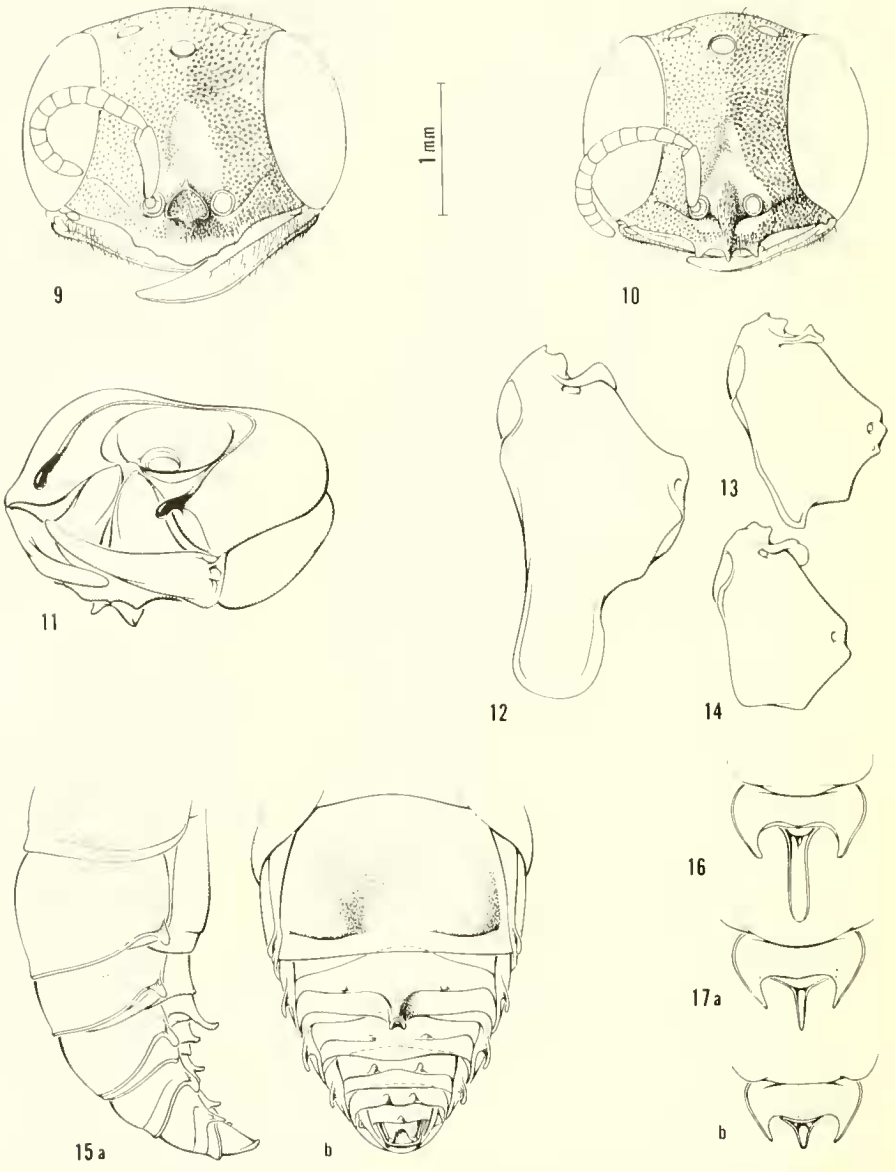
Apical fourth of abdominal terga slightly depressed below anterior part; terga III–VI with posterolateral tooth, that on III smaller; tergum VII with lateral margins weakly carinate and converging slightly posteriorly; sterna III–VI with strong, rounded transverse ridges, that on III with a median digitate process that is reduced to a tubercle in smallest specimens, narrow area behind ridges with brushes of erect setae; sternum VII with median longitudinal ridge weak or obsolescent.

Female.—Length 8.2–8.7 mm (Kohl states 9 mm for type), forewing 5.8–5.9 mm. As in male except as follows: head in frontal view (Fig. 1); clypeus with basal prominence more strongly ridged laterally, ridges sometimes meeting below, area below prominence with weak median ridge almost to apex, apical margin quinquedentate, tooth between median and lateral teeth very weak; head posteriorly (Fig. 4) with a pair of stout, angled, outwardly and obliquely directed processes on gena, separated from both occipital and hypostomal carinae though quite close to former; mesopleuron without anteroventral projection; propodeal mucro absent; terga without posterolateral tooth; pygidium with decumbent golden setae; sterna without ridges or brushes of erect setae.

Discussion

The combination of the processes on the posterior surface of the head in the female, the occurrence of allometric growth of the mesopleuron and sterna III–VII of the male, and the red scutum in both sexes distinguish *O. maidlii* of the Indian subcontinent and *O. stevensoni* Arnold, 1927, of Zimbabwe from other known species of the genus. To these characters may be added the absence of a propodeal mucro in the female of the former species and the noticeable reduction of the mucro in the female of the latter (Figs. 17a, b).

Cephalic Processes of Female.—The pair of processes on the posterior surface



Figs. 9–17. *Oxybelus (Anoxybelus) stevensoni* Arnold. 9, Female head, anterior aspect. 10, Male head, *idem*. 11, Female head, oblique view of posterior aspect, palpi omitted. 12–14, Mesopleuron of successively smaller males. 15, Male abdominal segments II–VIII (a, lateral; b, ventral). 16, Male metanotum and propodeal mucro. 17a, b, Metanotum and mucro of the two females.

of the female head was not noted by Kohl or Arnold. The head is held close to the forelegs in pinned specimens and the silvery vestiture on the gena also tends to obscure the processes. The processes are separated from the hypostomal and occipital carinae in *O. maidlii* but the hypostomal carina extends to the process in *O. stevensoni*. The function of the processes is unknown but I suspect that they could be used either in transporting slender prey or in removing soil from the

nests. Published data on other *Oxybelus* indicate that all prey upon Diptera and transport their prey either by impaling it on the sting or by carrying it with the mid and/or hind legs. Alternately, the processes could be grasped by the male during mating. The male fore tarsi, however, are not especially modified and are like those of other *Oxybelus*.

Females of both species have a strong median prominence at the base of the clypeus unlike the conformation of this area in other species. The sides are strongly ridged laterally, curved and meeting below or almost so in *O. maidlii* (Fig. 1), angulate and not meeting below in *O. stevensoni* (Fig. 9). The male clypeus is somewhat similarly modified in *O. maidlii* (Fig. 2), but in *O. stevensoni* (Fig. 10) the clypeus has a broad median process tapering to a point apically and overlying the median tooth of the thickened tridentate apical margin.

Allometric Growth in Male.—The males of *Anoxybelus* exhibit allometric growth on several parts of the body.The mandibles are disproportionately enlarged as the body size increases in *O. maidlii* (Figs. 2, 3), but not in *O. stevensoni* (Fig. 10).

The mesopleuron also demonstrates this kind of growth, the anteroventral area lacking a projection or having only a barely perceptible one in the smallest specimens of both species. As the body size increases there is a disproportionate enlargement of this area to form a lamelliform process extending downward (cf. Figs. 5, 6, 12–14).

A gradual arching of the top of the head is associated with the longer mandibles in *O. maidlii*. Undoubtedly this accommodates the increased musculature required to manipulate the mandibles. Presumably males with larger mandibles may be able to compete for females more successfully than their smaller conspecifics.

Concomitant with the overall increasing body size is gradual arching of the scutum. Doubtless this reflects the enlarged musculature needed for flight in heavier-bodied individuals.

Sternal Armature of Male.—Transverse rounded ridges on abdominal sterna III–VI are more strongly developed in *Anoxybelus* (Figs. 7a, b and 15a, b) than in other *Oxybelus*. A feature peculiar to the former subgenus is the presence of a digitate process on the middle of the ridge on sternum III that is reduced to a tubercle in small specimens or may be lacking in some *O. stevensoni* including the type. Larger specimens of *O. stevensoni* have a swollen rounded ridge toward the side of sternum II, not an oblique carina as Arnold stated. The transverse rounded ridges of sterna IV–VI in *O. stevensoni* are produced into a tubercle on either side of the midline in larger specimens, and there is a small median tooth on sternum VII; these modifications are not present in *O. maidlii*.

Coloration.—The two species of *Anoxybelus* are the only *Oxybelus* in which the scutum is light red. This sclerite is sometimes partly red in the North American *O. cornutus* Robertson but the erythrism is of a different character. If present, it does not cover the entire scutum but leaves a black area of variable extent posteriorly. Furthermore, the scutum may be entirely black, more frequently so in males than in females.

The two species differ from each other in that the pale maculations are white in *O. maidlii*, lemon yellow in the male of *O. stevensoni* and whitish yellow in that female. Also, the last two (♀) or three (♂) abdominal segments are light red

in the latter species and black in *O. maidlii*. There is a size difference also, males of *O. maidlii* being 5.8–8.7 mm long, those of *O. stevensoni* 4.5–7.0 mm, and their respective females being 8.2–8.7 mm and 6.5–7.2 mm.

Status of *Anoxybelus*.—Kohl justified separating *Anoxybelus* only by the lack of a propodeal mucro in his unique female of *O. maidlii*. The subgeneric validity cannot be based on this character, for a well-developed mucro is present in males of that species and of *O. stevensoni* and a much reduced mucro in the female of the latter. The other differentiating characters discussed above, however, do permit revalidation of *Anoxybelus* as a subgenus.

The two known *Anoxybelus* may be relict species apparently now occupying only a part of their former ranges or there may be related uncollected species in intervening areas. Certainly, each is quite rare. *Oxybelus maidlii* has been collected only three times at three localities in Sri Lanka and India. I visited the former country a dozen times, collecting in several localities in the Dry Zone during each visit, and obtained *O. maidlii* only once. *Oxybelus stevensoni* (2 ♀, 16 ♂) has been collected several times at two localities in Bulawayo District, Zimbabwe.

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